Diving into the Depths of Paleontology

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Mentor: Dr. John Scannella (Museum of the Rockies)

Rory Rossi has always been awed by the natural world and the history of this planet and has dreamed of being a paleontologist since he was very young. He came to Montana State University to pursue this lifelong passion. Rory is an undergraduate student in the Department of Earth Sciences, with a focus on paleontology. Under the guidance of his mentors, he is researching duck-billed dinosaurs at the Museum of the Rockies. Over the course of his undergraduate education he has been able to participate in research opportunities and international conferences, sharing his work with the larger paleontology community. He continues to overcome various challenges and believes in being open about his experiences in order to encourage and inspire future generations.

Paleontology, the study of ancient life, has always drawn me in—the pull of the past and the need to understand the Earth beneath my feet are irresistible. Imagining the life back in the ancient bones, the stories those fossils could tell is truly awe-inspiring. Prior to coming to Montana, I volunteered at the Morrison Natural History Museum in Colorado with Curator Matthew Mossbrucker, who took me under his wing and introduced me to the wonders of the ancient world.

My dream of studying ancient life and exploring how the Earth has changed over time is one of the main reasons I applied to Montana State University (MSU). Montana is known for its incredible fossil record and MSU is one of the best places in the world to study paleontology. I knew that Museum of the Rockies (MOR) was also part of MSU, and I was excited to see this museum that houses one of the largest collections of dinosaurs on the planet. I hoped I could become part of the exciting research going on there. When I arrived in Bozeman, I almost immediately began reaching out to the paleontologists at the museum, hoping that my initiative would help me find my way to a research project working with some of the incredible fossils that have been discovered in Montana.

I contacted everyone I could to inquire about possible volunteer opportunities at the museum. I eventually was able to start volunteering in the MOR Fossil Preparation Lab, where I worked to piece together dinosaur fossils so they would be ready for research and education. I hoped this would be the first step toward meeting and collaborating with the scientists I had read about before coming to Montana—people who were working at a museum I had dreamed about being a part of. One day while I was preparing dinosaur fossils in the preparation lab, I was able to meet the museum's Curator of Paleontology, John Scannella. I simply walked up to him and introduced myself. We shook hands, and a tattoo of a very controversial tyrannosaur specimen on my forearm caught his attention. "Is that the Cleveland skull?" he asked.

My tattoo of the tyrannosaur skull in the collections of the Cleveland Museum of Natural History—which, depending on who you talk to, is either a juvenile Tyrannosaurus rex or its own species, Nanotyrannus lancensis—has special meaning to me. Matt, the Morrison curator, has a T. rex skull tattoo on his left forearm. In a sort of homage to my mentor, I got the controversial Cleveland skull tattooed on my right. No matter what it is, it's a tribute to someone who took a chance on me and my dream of being a paleontologist.

At that moment, when John asked such a simple question, my heart dropped. In the past, research conducted at the museum had favored the hypothesis that the Cleveland skull was a juvenile T. rex. Matt and I, however, thought it might be a separate species. I thought "He's never going to let me work here." But I responded that my tattoo was indeed the Cleveland skull. Instead of telling me to leave the lab, John set a time to meet and discuss what exactly I wanted to research.

Coming into the Museum of the Rockies after having volunteered at another museum, one that often disagreed with some of the studies done by MOR, was odd. I worried about navigating the various disagreements and about how exactly to approach being a

researcher. I had never done research before, and I didn't even know what I wanted to study. Matt always reminded me, "Generalists survive, specialists go extinct" when I proposed possible research subjects. With so many different groups of dinosaurs, their evolutionary history, and extinction, it all felt overwhelming.

Some of my classmates at MSU could name almost every dinosaur and their characteristics. There were more dinosaurs and anatomical terms than I even thought possible. I worried that my skills were lacking. What was I supposed to know? I felt lost in a sea of information and had no idea where the shore was. Was I lagging behind my peers? Could I simply not break through into a new field?

My first meeting with John primarily focused on Nanotyrannus. Despite having this controversial animal tattooed on my arm I do not want to study tyrannosaurs. They are awesome, don't get me wrong, but I wanted to investigate something overlooked. I didn't want to focus on something that felt like it would draw the attention of many. I wanted to understand the ecology of the past, something that could bring deeper insight into new aspects of paleontology.

I told John I wanted to look at the larger picture. If possible, I wanted to have a good overall understanding of Dinosauria as a whole. I didn't want to pigeonhole myself into only studying one thing forever.

I was a little disappointed at first when John first showed me his idea for my research project. He opened a drawer filled with an array of tan-colored bones. All we really knew about the specimen in the drawer was it was from a marine deposit. It appeared to be some kind of hadrosaur, or duck-billed dinosaur. I knew almost nothing about hadrosaurs. I had seen hadrosaur teeth while in the field, but nothing else. The fact that this specimen had no skull only added to my dismay. This would be hard. How do you even write a description of something with random bones? I had never even taken an anatomy class. Suddenly I was in over my head.

I spent those first weeks drawing, measuring, familiarizing myself with the fossils, and attempting to figure out what my next steps were. How do I progress, how do I move to the next level? I spent hours examining the hadrosaur bones, exploring how I might be able to identify what kind of duck-billed dinosaur this was. Fueled by my dream of contributing something to paleontology, I asked many questions. I wanted to understand every aspect of the museum and every part of this field. I wanted this research project to be the foundation for my future career.

I saw my peers seemingly knowing exactly what to do. Their deep knowledge of the subjects they were passionate about made me worry. I felt behind my peers again. I entrusted Eric Metz, the MOR Paleontology Collections Manager-Registrar, with those worries. He sat down, as tears welled up in my eyes, and reminded me that it didn't matter if my knowledge wasn't encyclopedic yet. I was putting in the time to learn and to grow. He reminded me that if I was in the MSU paleo program, it meant I could succeed. I had goals and determination; I wanted to thrive in paleontology. I just needed to remember I couldn't know everything.

Although I still wished there were step by step instructions, a way for me to learn everything all at once, research follows its own path. Sometimes it will lead you down surprising roads where you learn things you'd never even thought of.

By studying scientific literature and making comparisons with other specimens in the MOR collections, I discovered that the subject of my research, MOR 1121, is a saurolophine hadrosaur. This group of duck-billed dinosaurs typically lacked the elaborate cranial crests found in other hadrosaurs. Maiasaura, Montana's state fossil, is a good example of a saurolophine hadrosaur. Large, powerful, and resilient creatures, hadrosaurs were among the most common herbivorous dinosaurs throughout the Late Cretaceous. Despite not being a rare type of dinosaur, MOR 1121 is special, at least to me.

Working with long-extinct animals for hours at a time in a basement with no windows only helps make a specimen more special. I grew to care deeply about this dinosaur. As I studied MOR 1121, I began to realize that instead of one animal, the bones seemed to represent at least two individuals. If true, this would be a rare, if not unique, occurrence in the marine rocks of Montana.

Time is such a hard thing for humans to process. Our

lives are short, especially when put against the eons that occurred before us. I started picturing the two dinosaurs swept out to sea, one a subadult and the other a larger adult. I wondered if they knew each other in life, if they were aware of each other in their final moments. I wondered what brought them together, in such a way that they would forever be preserved together through millions of years.

The thing about research is that life doesn't stop happening around it. As much as I wish I could put my life on pause, I can't. A few months into my hadrosaur research, I was diagnosed with fibromyalgia, an understudied medical condition little is known about. On top of that, I have issues with my joints and my back, along with chronic fatigue and brain fog. Still, I kept researching, reading papers in my free time, and reviewing my photos and drawings. I wanted to piece together this mystery. I felt connected, connected to the past. It often makes me wonder about all the things that had to go right or wrong, for me to be sitting there, holding a specimen that is close to 81 million years old. I think of all the moments that led me here and it leaves me speechless.

I presented some of my initial findings at the MSU Earth Sciences Student Colloquium and received positive and helpful feedback from my peers. Working with John and MOR's former Curator of Paleontology, Jack Horner, I submitted an abstract on my hadrosaur research for the 2024 meeting of the Society of Vertebrate Paleontology (SVP) in Minneapolis. I felt honored when I was fully funded by Vocational Rehabilitation, a Federal Program dedicated to helping disabled individuals, to attend the SVP conference and present my research. My work, my effort, and my dedication had come to fruition. I was attending a conference I had spent years dreaming of, and I would get to share MOR 1121's story.

I felt so seen when I arrived at SVP and saw so many different people. I saw other queer paleontologists, I saw other disabled paleontologists, and I met paleontologists I had dreamed of one day meeting. The most amazing part was that I felt like this was the start of something new. I felt my confidence in myself was restored. People agreed my work was good; and there were no arguments against my results. I felt reassured. This pathway was for me.

At times, I still feel ashamed when I use my crutches and have to rely on others for help. I feel I must prove myself—that I can do all the things that my able-bodied peers can. However, there are times my body simply will not cooperate. At SVP, I had another paleontologist tell me, "I thought about bringing my cane, but I was worried about what people would think." She thanked me for giving her confidence to use her cane more often. Since I use mobility aids in different ways every day, I felt proud I could inspire someone else who needs theirs to feel less ashamed. No one can ever be certain they will not end up with a disability. It can be hard to overcome the societal perceptions of what it means to have a disability.

Part of why I am so open about these parts of my life is because I believe in being the representation that I needed as a kid and the representation that I need now. Representation in the sciences is important, because without it, many may feel discouraged to even try as I have. Being transgender in a STEM field is difficult, especially when women are just beginning to break the barriers of science. I knew that to get opportunities in my dream field, I needed to be proactive. I knew I needed to work hard to break barriers and to clear the pathway to something that had for so many years felt out of reach. I had spent years wondering if I could even "make it" in the field.

The conference opened my eyes, it reminded me I do have a place in research and in paleontology. I gained new insight into worlds I didn't even know were possible. I saw a potential future; one I had been so unsure of. I have often wondered how my disability will affect my career as a paleontologist. It is something I worry about —I often think about how my body deteriorating at such a young age, on top of being transgender, might limit my options. This is something that drives me to work harder and to be noticed, because I love this field. I love paleontology. I find ways to participate that don't leave my body screaming, and I find ways I can manage my pain. Research lets me do that while also opening doors to future opportunities for me.

I may still be wading through uncertainties, unsure of what my next steps are and how to proceed, but that is part of what research is. It is trial and error. It is going down rabbit holes to answer interesting questions, even if they are not directly related to the project at hand, because they may lead to new questions and new

ways of seeing the world. I wonder where my research will take me. What I can do as a disabled, trans paleontologist is encourage others to pursue science. This changing world scares me, but it does not dissuade me from my passion. It doesn't ever make me feel like I should quit paleontology. If anything, it makes me more determined to be open about this part of me, especially within my scientific community. Without people in science being their honest selves, there cannot be progress. To conform to what is expected is not the way to true scientific innovation. It does not lead to breakthroughs. Science will persist. The world is changing, which means adaptation and perseverance, but it also means finding joy. I have found joy in being transgender, which is a long process , to unlearn hate and fear. I have found joy in my research, my family, my friends, and my ferrets. For me, research has been a chance to change the world and to change people's perceptions of what it means to be transgender.

To me, research is curiosity in its rawest form. There is nothing like discovery. Throughout all the life events, my disability, my identity, these questions still need answering. These questions pull me into a different world. I think of the hadrosaurs, what stories they still might be able to share with me. I think of what those bones might whisper to me—those echoes of a world that existed 81 million years ago—and I am excited for what I may discover in the future.

About the Author

Rory Rossi is a second-year student at Montana State University majoring in Earth Sciences with a concentration in Paleontology, and a minor in Museum Studies. Rory has worked with Dr. John Scannella at Museum of the Rockies since the Fall of 2023. Rory moved to Bozeman to pursue a lifelong dream of being a paleontologist. In his free time Rory loves to knit, spend time with their ferrets and their husband, as well as paint and swim. They hope to continue their studies in graduate school and continue to advocate for disabled and transgender students.